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(54) IMPROVEMENTS IN OR RELATING TO FLUID CONTAINERS, ESPECIALLY BUT NOT EXCLUSIVELY TO CONTAINERS OF THE FLUID DISPENSER TYPE

(71) We, PLANT INDUSTRIES, INC., a corporation organized and existing under the laws of the State of Delaware, of 1235 South State College Boulevard, Anaheim, California 92805, U.S.A., do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

The present invention relates to a fluid container, especially but no exclusively to a container of the fluid dispenser type.

The use of expansible membranes or bladders for the storage and dispensing of fluids, especially viscous ones, has been suggested hereinbefore in order to replace the ubiquitous aerosol container. The reason for wanting to replace the aerosol-type dispenser is because of the health hazard that these containers present. Firstly, there is some medical evidence to indicate that a number of people are afflicted with serious asthmatic or other traumatic attacks from the inhalation of the fluoro hydrocarbons normally utilised as propellants.

Secondly, the high pressures under which the aerosol containers are put present safety hazards, especially once the consumer product contained within the containers has been expelled. Thus, heating or incineration of the aerosol containers have resulted in mishaps due to the resultant explosions.

However, in some of the containers that have been proposed that obviate the use of a propellant such as the fluorinated hydrocarbons, it has not always been possible to store a fluid for a prolonged period of time without the deleterious results to the effective functioning of the dispenser. It has been difficult to match the material or fluid to be contained with the particular bladder or expansible membrane which was to contain the fluid or material. In many instances, it was possible to obtain compatibility with the product to be stored but the compatibility was short-lived or did not provide the necessary expelling force to the fluid or material contained in the dispenser.

In the storage of fluids, it is necessary for obtaining an effective dispenser to not only provide an impermeable boundary or barriers for the fluid to be stored, but also to provide a force acting upon the fluid which will effectively dispense it from the container over the life of the product.

Hence, in dealing with containers of the expansible bladder type, the most important parameters to be considered are permeability of the product and elasticity or elastic memory of the bladder sufficient to be able to provide an expelling or dispensing force even after the expansible bladder has contained the fluid to be stored over a prolonged period of time. In most instances, where the bladder would satisfactorily retain the fluid therein, it was found that after a short period of time, the bladder took a set and could no longer exert the necessary force upon the stored fluid to exert a dispensing force thereon. In other instances, where the bladder had high elastic memory and thus would not take an undue set, it was found that its resistance to permeability was not effective for many products or components thereof.

It is an object of the present invention to obviate or mitigate the above disadvantages.

According to one aspect of the present invention there is provided a fluid container having an outer substantially rigid housing; a first conformable resilient elongate body in the housing adapted to hold fluid and having the ability to resist molecular or other fluid migration therethrough, a second outer conformable elongate body in the housing nesting the first body, said second body when the first body is in the unstressed unfilled state being substantially congruent in configuration to, juxtapositioned to and in contact with said first body and having an elasticity sufficient to exert a force on said first body for expulsion of stored fluid from said first body;

each of said bodies having an open end and a closed end.

Preferably, said first body is inert to the stored material and comprises a butyl-type elastomer and said second body is fabricated of a latex-type elastomer having high elastic memory.

According to another aspect of the present invention there is provided a fluid dispenser comprising a substantially rigid container housing and cover therefor, including a fluid passageway communicating the exterior of the container housing to a valve member supported within said container housing, a first inner resilient expansible body of fluid impermeable character having an open end and a closed end, the cross-sectional area proximate said open end being larger than the cross-sectional area of said closed end, said first expansible body being adapted to be retained within said container housing and store fluid therein; a second outer expansible body in the housing nesting said first body, said second body when the first body is in the unstressed unfilled state being substantially congruent in configuration to, juxtapositioned to and in contact with said first body; a valve seating member disposed in axially shiftable relationship within said valve member and adapted to open and close the fluid flow between said fluid passageway and the interior of said first expansible body; and a mandrel within said first expansible body forming a dispensing flow path for fluid stored within said first expansible body and pretensioning said first and second expansible bodies, said expansible body having high elastic memory and being conformable with said first expansible body when same is filled with a fluid, said second body exerting a dispensing force on the first body to expel said fluid when said valve seating member is unseated.

Embodiments of the present invention will now be described by way of example with reference to the accompanying drawings in which:—

Fig. 1 is a side view, in partial cross-section of a fluid dispenser according to one embodiment of the present invention;

Fig. 2 is an exploded view of the interior components of the fluid dispenser shown in Fig. 1 illustrating their order of assembly;

Fig. 3 is a cross-sectional view taken along the line 3—3 of Fig. 1;

Fig. 4 is a partial, cross-sectional view of another mandrel member that may be utilised in lieu of that shown in Figs. 1 and 3 and as would be taken along the line 3—3;

Fig. 5 is a fragmented view, in cross-section of a fluid dispenser according to a second embodiment of the present invention; and

Fig. 6 is a fragmented, cross-sectional view of a fluid dispenser according to a third embodiment of the present invention.

Referring to the drawings wherein like numerals of reference designate like elements throughout and referring specifically to Fig. 1, a dispenser 2, one of the several embodiments of the invention, is shown as comprising a container body 4 in the preferred form of moldable plastics wherein the walls thereof form a neck portion 6 and an interior cavity or chamber 8 with the bottom interior wall thereof being formed by a base 10 thereby forming an enclosed physical barrier or container 12 for purposes which will become apparent as the description proceeds herein.

Supported on neck 6 is collar member 14 integrally molded and connected as by connection ribs 16 and forming a mouth opening 18 which receives a valve assembly as will be described in nestled relationship as shown in Fig. 1.

Cover member 22 is of the usual type having a fluid passageway 24 formed by the walls 26 thereof, communicating the exterior 28 to the inlet 30 which is in communication with the valve assemblage received within the mouth 18 as will be described.

The cover 22 is of molded plastics and fits onto the collar 16 and is rotatable with respect thereto into a locked position and oppositely rotatable to an open position. Suffice to say that in order to obtain operability of the dispenser 2, and more specifically actuation of the valve mechanism, the locked position prevents depression of the cap 22 and more specifically the communication of inlet 30 with the valve assembly received in nestled relationship within the mouth 18. Other forms of cover members are also contemplated.

The valve assembly 32 received within the mouth 18 of the dispenser 2 comprises, (in the order of assembly shown in Fig. 2) ferrule member 34 of thin wall deformable metal, aluminium for example, of generally cylindrical design having an orifice portion 36 communicating to the inlet 30 of passage 24 of cover member 22. Ferrule member 34 may have a thickness of about 0.020 of an inch so that the lower portion thereof may be crimped or bent as shown at 38 (Fig. 1) after assembly of the valve assembly 32 as will become apparent.

An upper portion 40 of cylindrical configuration provides an interior recess to receive the valve seat 42 in this instance, an annular disc of conformable rubber, having a central aperture 44 to accommodate inlet 30 of passage 24. Ferrule 34 has a depending exterior wall which as indicated earlier, becomes crimped as at 38 in later assembly. The interior configuration of ferrule 34 is adapted to receive in nestled, tight or close fitting relationship, the remaining components of the assembly as can be seen in Fig. 1 and as will now be described.

A valve seating member 46 having an

annular portion 48 with spaced protuberances 50 provides the manipulable component of the valve assemblage 32 to allow dispensing of fluids contained within the dispenser 2 as will become apparent. The upper surface 52 of member 46, which member is axially shiftable as will become apparent, into and out of fluid-tight relationship with the under surface 54 of valve seat 42 permits fluid to flow between the spaced protuberances or projections 50 peripherally spaced on the exterior surface of annular portion 48.

The under surface of annular portion 48 and depending portion 56 are adapted to receive in cooperation, coil spring 58 which coil spring acts against the upper surface 60 of a mandrel 62 having upstanding opposed projections 64 at the upper portion thereof to captively hold coil spring 58.

To effect proper positioning of coil spring 58, a button protuberance 66 may be provided on the surface 60 of mandrel 62. It should be obvious that the coil spring 58 normally positions and biases seating member 46 into the seating or closed position with respect to valve seat 42 thereby effectively blocking fluid flow to passageway 30. The depending portion 56 and protuberance 66 abut to limit the inward movement of the seating member 46.

Mandrel member 62, in this instance, may be of molded plastics and is cruciform in cross-section (Fig. 3) having the ribs 68 symmetrically arranged thereby forming flow paths 70 therebetween to alloy for fluid flow into (during the filling operation) and from within the expansible member through the valve assemblage 32 into the inlet 30 and ultimately through the outlet 24 formed by cap member 22. The mandrel 62 is just slightly longer than the expansible members making up the containers of this invention, but not so long as to extend the entire length of the chamber 8 formed by body 4 and base 10 of the dispenser 2. Other lengths may be useful.

The next component valve body member 72 is of general cylindrical configuration having a first annular portion 74 providing an abutment or stop upon which valve seat member 42 is supported. A next cylindrical but larger portion 76 is of depending skirt configuration having a tubular depending extension 78 with a tapered end portion 80. It will be noted that the valve body member 72 is of a size to be received within the interior of ferrule member 34 and forms with the depending collar portion 76, a means to receive the open upper ends of the expansible members in fluid-tight relationship as shown in Fig. 1.

The first expansible bladder or membrane 82 is of a material which is compatible with the fluid or material to be stored therein and generally will be of butyl-type elastomer which is highly impervious to the materials to be stored therein. It will be noted that the upper flange portion 84 is substantially square in cross-section and is tightly received within the depending collar 76 of valve body member 72. The second expansible bladder or membrane 86 is generally slightly larger than the first expansible member 82 and has an upper flange portion 88 which is slightly larger than the flanged portion 84 and is of a different shape. That is, the upper flange 88 is of frusto-conical configuration so as to be received within the sinuosity formed between the valve body member 72 and a locking ring 90. Other fluid-tight arrangements are possible. The first and second bladders 82, 86 are both longitudinally and radially stressed.

The locking ring 90 also of molded plastics, is generally collar-like in configuration having a first collar portion 92 adapted to be received in snug, nestled relationship within the collar 14 of dispenser 2 in a snap-action fitting manner. It will be noted that the upper portion 92 of snap ring member 90 is adapted to retain the flanged portions 88 and 84 of expansible membranes 86 and 82 respectively and to do so while being received in snug engagement within ferrule member 34. The depending walls of the member 34 are eventually crimped to form a rigid assemblage as shown in Fig. 1.

Snap or locking ring 90 has a plurality of spaced locking legs 94 on the lower collar portion 96 which ring 90 is formed of a deformable plastics and which is received as earlier indicated, within the collar 14 in friction-fit, snug relationship.

There are other embodiments of the invention which will now be described which provide for an effective fluid dispenser as functional as the one just described. For example, the mandrel member previously described need not be cruci-form in cross-section but may be oval in cross-section as illustrated in Fig. 4. It has been found that ribs or grooves or other such means, are not necessary to form fluid paths for the materials to be dispensed within the confines of the first bladder 82. Thus, the elasticity or resilience of the second bladder 86 substantially coextensive with the first expandible bladder 82, will create a dispensing force tending to drive the fluid along the extent of the oval mandrel.

Further embodiments are as illustrated in Figs. 5 and 6 and utilise slightly different constructions. For example, referring now to Fig. 5, it will be seen that a secondary ferrule member 102 is utilised in the structure wherein there is permitted the assembly of sub-assemblies prior to assembly into the final assembly of the dispenser. In this instance, the order of assembly, as for example shown in Fig. 2, is somewhat different. The outer or second

bladder 86 is assembled with the snap ring 90 to comprise one sub-assembly and the first bladder 82 is combined with the valve body member 72. The snap ring with the positioned second or outer bladder is then joined in cooperative relationship with the valve body member 72 by means of secondary ferrule 102 which is crimped at the lower portion 104 thereof to provide the sub-assembly. Thereafter, when complete assembly is contemplated, the mandrel 62 is driven into the bore of the valve member and assumes the locked relationship shown thereby pretensioning and extending the first and second bladders 82 and 86 respectively, and thereafter the coil spring 58, valve actuator 46 and valve seat 42 are positioned within the ferrule 34 and the outer ferrule crimped over at the lower portion thereof as shown in Fig. 5 to securely position and join all of the elements in cooperative relationship.

Referring now to Fig. 6, there is shown a construction which does not utilise a secondary ferrule member but instead a ferrule member 112 is utilised which has an open upper portion 114 shown in dotted line with a lower portion configured substantially as earlier described for ferrule 34. In this instance, however, the order of assembly is that the mandrel 62 is snapped into a temporary locked position after the first and second bladders, locking ring and valve body are assembled and held together with the ferrule 112 being thereafter crimped as at 116. The valve spring 58, valve actuator 46 and and valve seat 42 are thereafter positioned in place along with a plastics annular cap member 118 which forms the upper abutment surface for valve seat 42 and thereafter the upper portions 120 of ferrule 112 are bent over and crimped as shown in full line Fig. 6.

It should be understood that the specific structures described hereinabove, may be varied considerably with respect to individual components utilised and their specific design and configuration modified as those of ordinary skill in the art will recognise without departing from the invention as defined in the appended claims. Thus, many alternatives and modifications will suggest themselves to the skilled person.

While there are a great many chemical formulations from which the first or inner bladders may be made, it is not only important to consider the impermeability of the material with respect to fluids or other substances which it will eventually contain, but also its overall compatability. By compatability is meant the ability of the formed membrane or bladder to store fluid for an acceptable shelf-life period without permitting migration or permeation of the fluid therethrough and to remain inert and substantially unaffected by the contained fluid. Additionally, it is important that the end material be capable of functioning in a manner to produce an effective overall container.

For example, the first or inner membrane must not only be impermeable, it must also meet certain other criteria for effective use in a container of the type embraced by this invention. The material must be able to have a substantial ability to expand and contract without bursting; must be able to have some degree of elasticity and generally must meet the criteria necessary to satisfactorily perform in the manner as disclosed herein.

While a butyl-type elastomer, polymer or copolymer has the lowest permeability, it may not always be the most satisfactory when considering other factors. For example, butyl has a low permeability to most products, but is not necessarily compatible with some as for example, alcohol and oil. For example, chloro-butyl, while not as satisfactory as butyl with regard to permeability, is easier to use and in some instances, much more desirable than the butyl polymer without the chloro radical. Permeability to fluids may be determined by acceptable test procedures such as ASTM D814-55.

In any event, notwithstanding some of these properties, it is important that the inner bladder, which contains the fluid or material to be stored, meets certain minimum criteria so as to be able to function satisfactorily in containers of the type herein under discussion.

For example, it has been found that the wall thickness of the formed bladder may be within the range of about 0.040 to 0.060 inch and that the material used should also be capable of producing a bladder that is compatible with the material to be stored and should have a modulus of about 300 at 500% elongation. Additionally, it should have an ultimate tensile strength of about 2000 psi plus or minus 200 with an elongation factor of at least 850% which includes a satisfactory safety factor. The set that the material takes after standing, should not be more than about 20%, although this of course, will vary depending upon the ultimate elasticity or elastic memory of the butyl-like material used and to some degree is influenced by the material used for the second or primary power bladder which furnishes the majority of the force used to dispense the stored product. These parameters may be easily determined utilising accepted ASTM procedures, modified where necessary to meet the circumstances.

If undue set occurs, folds and/or wrinkles will form in the inner membrane making it difficult, if not impossible, to dispense the fluids contained within these folds. This undesirability is manifest. Volume expansion of the formed bladder should be at least 800 cc and the S_t/S_i should be at least 22. (S_tS_i refers to the thin film or bubble burst test

that is applied to a section of the membrane. The so-called S_1/S_2 for the membrane itself varies over the entire surface area of the expanded membrane. Values may range from 0.8/1 to 15.0/1. The relationship is determined by "gridding" or stamping the unexpanded membrane surface with squares 0.1 in width x 0.1 in length and measuring the width and lengths in various sections at different degrees of inflation. The primary objective of this type of test is to determine uniformity of expansion over the entire area and also the shape or profile for various volumes). All of the foregoing parameters are applicable for an ultimate container of the 8 ounce size variety. Obviously, some of the foregoing parameters will change depending upon the ultimate size of the container desired and are merely given for guide purposes.

The foregoing physical constants are determined for the most part, as previously indicated, according to accepted testing procedures utilising for example, the Scott Test Procedures in order to determine the modulus, tensile strength and elongation factors, whereas the S_1/S_2 and volume test are determined by the thin-film burst tests as outlined in High Polymer Latices, D. C. Blackley, Palmerton Publishing Co., New York, Vol. 2 Chapter VIII, Section 17.3.2.

Other types of butyl-type elastomers will also suggest themselves with respect to the ultimate end uses to which they are to be put. For example, where a food product, or the like, is intended to be the material or fluid to be contained in the first bladder, FDA approval must be available and where other products are contemplated that have a deteriorating effect upon the more commonplace butyl-elastomers, other compounds such as nitrile rubber, neoprene and the "Vitons" (Trade Mark) may be resorted to. In each of these instances, however, the basic physical properties as outlined heerinbefore, should be followed in order to have the most satisfactory container combination possible. In most instances, the butyl-type bladder or membrane will be molded as opposed to dip formed, but obviously where the materials from which the first or inner membrane is made, can meet the aforedescribed criteria, it matters not what manufacturing procedure or processes are employed. It will be understood that other shapes are possible for the membrane.

The materials that are most suitable for the manufacture of the second or outer membrane, are the latex-type compounds. Undue regard need not be made with respect to permeability. However, the selected material should be of the type that closely approximates the basic physical consideration and parameters outlined above for the inner membrane or bladder, and in addition, one important criterion. This salient factor is that of elasticity or elastic memory. Elasticity must be such that the second member or membrane will always retain a sufficient tendency to return to its original, natural or unfilled state, so as to be capable of exerting dispensing forces upon the material contained within the first or inner membrane. For an 8 ounce size container, it is most desirable that the initial force exerted by the outer bladder or membrane, be in the area of about 15 psi with a final force factor of about 9 to 10 psi. It is, of course, obvious that at the initial period of shelf life of a recently-filled container, the inner membrane will help contribute some of the dispensing force which, depending upon the material utilised, will dissipate over a period of time because of the poor elastic memory of some of the butyl-like elastomers.

The second or outer membrane should have a modulus of about 500 or more at 500% elongation, and a tensile strength of roughly 3000 to 5000 with an elongation factor within the range, of about 750—1000%. The volume test should be at least not below 600 cc and preferably about 800 cc at a 14 psi pressure. The S_1/S_2 ratio should desirably be in the 25—35 range at a stress factor of about 7000 to 14000.

It has been found that most materials of the natural latex-type, natural or otherwise, will give the characteristics outlined above, wherein the wall thickness of the bladder lies within the range of about 0.030 to 0.090 inch. In most instances, an improved performance bladder is obtained by double or even triple dipping allowing the individual coats of material to dry or cure between dippings. That is not to say, however, that other materials that are moldable and still meet the foregoing criteria, will not suffice as indeed many other such materials will perform satisfactorily.

With respect to the first or inner bladder and the second or outer bladder, it is important that the physical relationship be maintained. It will be understood that configurations of the bladders other than those illustrated are indeed possible just so long as the two members are substantially coextensive and preferably congruent in configuration and the following relationships be maintained.

The outside diameter of the first or inner bladder should be such as to combine with the second bladder in nesting relationship so that sufficient contact at the interface thereof is obtained in order to ensure simultaneous distention and extension of the bladders during the filling process. Relative movement between the physically assembled first and second bladders, at the interface thereof, should be curtailed and avoided if possible, to eliminate the possibility of rupturing or localised overstressing of one bladder with respect to the other.

It is also important that the respective

dimensions of the bladders be such that there is no excess or surplusage of material at the interface formed by the exterior of the first bladder and the interior of the second or outer bladder. The avoidance of the excess or surplusage prevents wrinkling of the bladder at the interface and eliminates the possibility of entrapment of fluid or material which is to be stored in the container in the voids and cavities of the wrinkles which would be produced by having oversized bladders and which formation would occur during the filling process. In order to aid in the correct interface condition formation, a frictional-reducing material is preferably placed on either the exterior surface of the first or inner membrane or on the inside surface of the second or outer membrane. Such materials may comprise cornstarch, calcium carbonate, finely ground corn cobs or any of the other known such desiccant-type materials.

The specific configuration of the upper portion or extremities of the bladders is important with respect to the prevention of relative movement and displacement thereof with respect to one another, and with respect to the valve assembly with which they are assembled. For example, it will be noted that the first or inner bladder membrane, is provided with an upstanding flange of relatively square cross-section whereas the latex-type bladder or membrane is provided with a frusto-conical upper extremity, all of which ensure satisfactory performance of the double bladder containers of this invention. Other modes are contemplated.

While the invention has been specifically described as it relates to non-aerosol-type containers, it is of course obvious that the basic idea of containing a substance in an impervious first member and having a second member coextensive therewith to exert dispensing forces on the stored material for one reason or another, has broader application as might be found in pressure accumulators, storage tanks, and other similar applications. All such applications will satisfy the present invention as covered by the appended claims.

Using the criteria for the containers of this invention and specifically the disclosure directed to the Fig. 1 embodiment, a plurality of containers were fabricated and satisfactorily tested with various products from water to heavy viscous fluids such as hand creams. One such container is described below.

Example 1.

A butyl elastomer from WARCO, a fabricator of elastomeric products, and specifically designated WARCO SP-8A, was utilized to fabricate a first or inner bladder using conventional molding techniques. The thickness of this member was 0.038 inch.

A second bladder or member was fabricated using a multi-dip process from a latex-type elastomer from Uniroyal Co., product designated Nat. 5085.

These materials produced bladders having the following characteristics:

	Modulus 500% PSI	Tensile strength PSI	Elong. %	VOLUME TEST PSI	Volume expansion Membrane, ml, V (from Vo=5ml)	S_f/S_o	Bubble Stress
BUTYL	307	2123	937	7.0	745	23.2	3940
LATEX	418	4370	843	14.0	1160	27.9	12630

These bladders performed satisfactorily for most products tested having an acceptable shelf life and level of performance.

Thus, there has been disclosed containers for a myriad of products wherein the products are dispensed without the use of propellants of the conventional type.

WHAT WE CLAIM IS:—

1. A fluid container having an outer substantially rigid housing; a first conformable resilient elongate body in the housing adapted to hold fluid and having the ability to resist molecular or other fluid migration therethrough, a second outer conformable elongate body in the housing nesting the first body, said second body when the first body is in the unstressed unfilled state being substantially congruent in configuration to, juxtapositioned to and in contact with said first body and having an elasticity sufficient to exert a force on said first body for expulsion of stored fluid from said first body; each of said bodies having an open end and a closed end.

2. A container as claimed in claim 1 wherein said first body is fabricated of a material that is compatible with the fluid to be stored.

3. A container as claimed in claim 2 wherein said first body is inert to the stored fluid and comprises a butyl-type elastomer and said second body is fabricated of a latex-type elastomer having high elastic memory.

4. A container as claimed in claim 2 or 3 wherein the force exerted by said second body is sufficient to expel substantially all of the stored fluid.

5. A container as claimed in claim 4 wherein the wall construction of said second body is formed by a multi-dipping process and the wall construction of said first body is of integrally moulded construction.

6. A container as claimed in any one of the preceding claims wherein the wall thickness of said first body when in the unstressed condition lies within the range of about 0.040 to 0.060 inch.

7. A container as claimed in claim 6 wherein the wall thickness of said second body when in the unstressed condition lies within the range of about 0.030 to 0.090 inch.

8. A container as claimed in any one of the preceding claims wherein a layer of friction reducing material is positions at the interface between said first and second bodies to facilitate nesting of said first and second bodies.

9. A container as claimed in claim 8 wherein the open end of said first body is provided with a flange of substantially square cross-section.

10. A container as claimed in claim 9 wherein the open end of said second body is provided with a frusto-conical configuration.

11. A container as claimed in claim 10 wherein said first and second bodies are prestressed prior to filling with said fluid to be stored.

12. A container as claimed in claim 11 wherein said first and second bodies are longitudinally and radially stressed.

13. A fluid dispenser comprising a substantially rigid container housing and cover therefor, including a fluid passageway communicating the exterior of the container housing to a valve member supported within said container housing, a first inner resilient expansible body of fluid impermeable character having an open end and a closed end, the cross-sectional area proximate said open end being larger than the cross-sectional area of said closed end, said first expansible body being adapted to be retained within said container housing and store fluid therein; a second outer expansible body in the housing nesting said first body, said second body when the first body is in the unstressed unfilled state being substantially congruent in configuration to, juxtapositioned to and in contact with said first body; a valve seating member disposed in axially shiftable relationship within said valve member and adapted to open and close the fluid flow between said fluid passageway and the interior of said first expansible body; and a mandrel within said first expansible body forming a dispensing flow path for fluid stored within said first expansible body and pretensioning said first and second expansible bodies, said second expansible body having high elastic memory and being conformable with said first expansible body when same is filled with a fluid, said second body exerting a dispensing force on the first body to expel said fluid when said valve seating member is unseated.

14. A fluid dispenser as claimed in claim 13 wherein said mandrel and said first and second expansible bodies have substantially the same axial length in the unfilled state.

15. A fluid dispenser as claimed in claim 14 wherein said first expansible body is compatible with and substantially impermeable to said fluids to be stored therein for a sufficient time to provide an acceptable shelf life.

16. A fluid dispenser as claimed in claim 15 wherein said first and second expansible bodies are retained in secured relationship proximate the open ends thereof.

17. A fluid dispenser as claimed in claim 16 wherein the open end of said second body terminates in a frusto-conical configuration.

18. A fluid dispenser as claimed in claim 17 wherein the open end of said first expansible body terminates in a flange of substantially square cross-section.

19. A fluid dispenser as claimed in claim 18 wherein said first and second expansible bodies form a substantially smooth interface therebetween.

20. A fluid dispenser as claimed in claim 19 wherein said first expansible body comprises a butyl-type material.

21. A fluid dispenser as claimed in claim 20 wherein said second expansible body comprises a latex-type material of relatively high elastic memory.

22. A fluid dispenser as claimed in claim 18 wherein said mandrel is cruci-form in cross-section.

23. A fluid dispenser as claimed in claim 18 wherein said mandrel is oval in cross-section.

24. A fluid dispenser as claimed in claim 18 wherein said valve member includes a valve body member having a valve seat and said valve seating member acts thereagainst to close fluid flow betwen said fluid passageway and the interior of said first expansible body.

25. A fluid dispenser as claimed in claim 24 wherein said valve seating member is normally spring biased into the closed position.

26. A fluid dispenser as claimed in claim 25 wherein said mandrel has a plurality of spaced grooves extending substantially the length thereof and the outer portion is adapted to form fluid paths for the fluid stored in said first expansible body to said fluid passageway.

27. A fluid dispenser as claimed in claim 26 wherein said valve seating member comprises an annular head with spaced peripheral

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protuberances thereabout, and a depending spring centring portion limits the inward movement thereof by abutting a surface of said mandrel.

28. A fluid dispenser as claimed in claim 27 wherein said spring is coil-shaped and is positioned to react against the under surface of said annular head and an outer surface of said mandrel.

29. A fluid dispenser as claimed in claim 28 wherein the outer surface of said head forms a sealing lip to engage the under surface of said valve seat in fluid-tight relationship.

30. A fluid dispenser as claimed in claim 29 wherein said valve seat and valve body member are received in nestled relationship by a ferrule member of deformable character and said valve seat is a disc of conformable material having a duct of the same size as said fluid passageway and communicating therewith.

31. A fluid dispenser as claimed in claim 30 wherein said disc is retained in position with said valve body member by said overlying ferrule member and said ferrule member has an aligned aperture accommodating said fluid passageway and said duct.

32. A fluid dispenser as claimed in claim 31 wherein the open ends of said first and second expansible bodies are retained in fluid-tight relationship and a locking collar member received within said ferrule is adapted to engage the interior wall of said container housing and position the bodies within the neck of said container housing with the co-action of said ferrule member.

33. A fluid dispenser as claimed in claim 29 wherein the open ends of said first and second expansible bodies are received by the inner portion of said valve body member and said valve seat and valve body member received in nestled relationship by a ferrule member of deformable character to form an assembly and said valve seat is a disc of conformable material having a duct of the same size as said fluid passageway and communicating therewith and the neck of said container housing is adapted to support said assembly and expansible bodies in retained, fluid-tight relationship.

34. A fluid dispenser as claimed in claim 33 which includes a snap ring member received within said ferrule member with said open ends of said expansible bodies being retained in fluid-tight relationship therebetween and is adapted to engage the interior wall of said container housing and position the assembly within the neck of said container housing with the co-operation of said ferrule member in locked relationship.

35. A fluid dispenser as claimed in claim 34 wherein a depending wall portion of said valve body member and the opposed exterior surface of said snap ring member form a sinuosity within which the open end of said second expansible body is received in retained relationship.

36. A fluid dispenser as claimed in claim 35 wherein a secondary ferrule is disposed within said ferrule member and engages an outer portion of said mandrel member and lateral contiguous portions of said valve body member and the lower portion of said snap ring member to form an initial sub-assembly prior to insertion into nested relationship with said ferrule member.

37. A fluid dispenser as claimed in claim 34 wherein an outer surface of said mandrel forms a receiving recess for said valve seat and is retained therein by an annular retaining member disposed between it and an outer crimped over portion of said ferrule member.

38. A container substantially as hereinbefore described with reference to Figs. 1 to 3 or to Figs. 1 to 3 as modified by Fig. 4, or to Figs. 1 to 4 as modified by Figs. 5 or 6, of the accompanying drawings.

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1473524 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

Fig. 1.

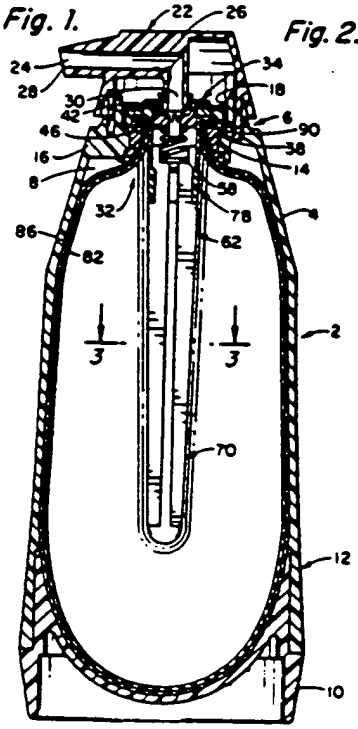
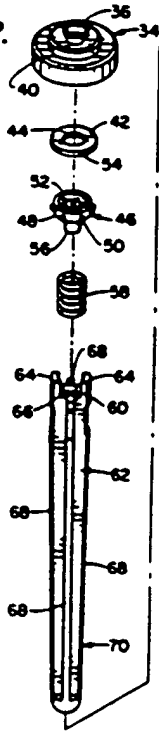


Fig. 2.



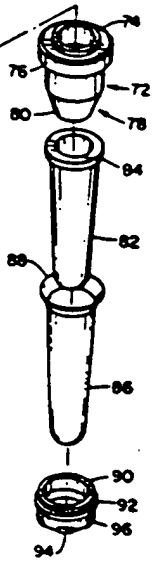


Fig. 3.

Fig. 4.

Fig. 5.

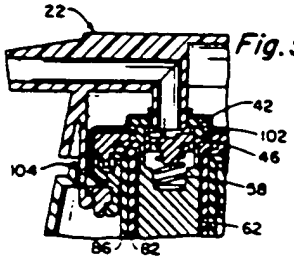
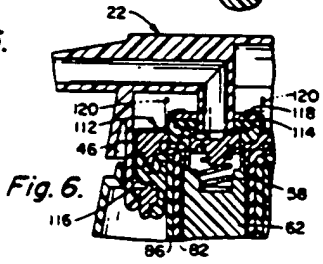


Fig. 6.



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